

TE and enhancer annotations

MB Miguel R Branco

Updated date: Jan 14, 2022

 An abbreviated version of this protocol was published in eLIFE in Apr 2019

Functional evaluation of transposable elements as enhancers in mouse embryonic and trophoblast stem cells

DOI: 10.7554/eLife.44344

Detailed protocol

1. Download Repeatmasker annotation for specific TE families

On the UCSC genome browser (<http://genome.ucsc.edu>) select Tools - Table Browser. Select the correct genome assembly (we used mm10), group (Variation and Repeats) and track (RepeatMasker). Select 'genome' in the region of interest section. To download annotations for a specific TE family, create a new filter, placing the name of the family (e.g., RLTR13D6) on the repName field. Name the file and click 'get output'.

2. Define TE-derived enhancers

Coordinates for ATAC-seq peaks and ChIP-seq peaks for H3K4me3, H3K27ac and transcription factors were obtained as described in the 'Primary data processing' section of the paper's Methods. These peak coordinates (in bed format) were used to filter the TE annotations from above, using intersectBed (from bedtools; <https://bedtools.readthedocs.io/en/latest/>) as follows:

- Exclude TEs overlapping H3K4me3 peaks (using the -v option of intersectBed)
- Keep TEs overlapping H3K27ac (using the -u option)
- Keep TEs overlapping ATAC-seq peaks (using the -u option)
- Keep TEs overlapping at least one transcription factor peak (merging the relevant transcription factor annotations into one file and using the -u option)

3. Define non-TE enhancers

Using the same peaks coordinates as above, ATAC-seq peaks were filtered using intersectBed to:

- Exclude peaks overlapping any TEs (using the full Repeatmasker table, and option -v on intersectBed)
- Exclude TEs overlapping H3K4me3 (as above)
- Keep TEs overlapping H3K27ac and at least one transcription factor (as above)

R code associated with this protocol is available at <https://github.com/Christopher-Todd/Todd-eLife-2019> ('Define_enhancers' directory).

How to cite: (Readers should cite both the Bio-protocol preprint and the original research article where this protocol was used)

1. Branco, M. (2022). TE and enhancer annotations. Bio-protocol Preprint. bio-protocol.org/prep1507.
2. Todd, C. D., Deniz, Ö., Taylor, D. and Branco, M. R. (2019). Functional evaluation of transposable elements as enhancers in mouse embryonic and trophoblast stem cells. eLIFE. DOI: [10.7554/eLife.44344](https://doi.org/10.7554/eLife.44344)

Copyright: Content may be subjected to copyright.